

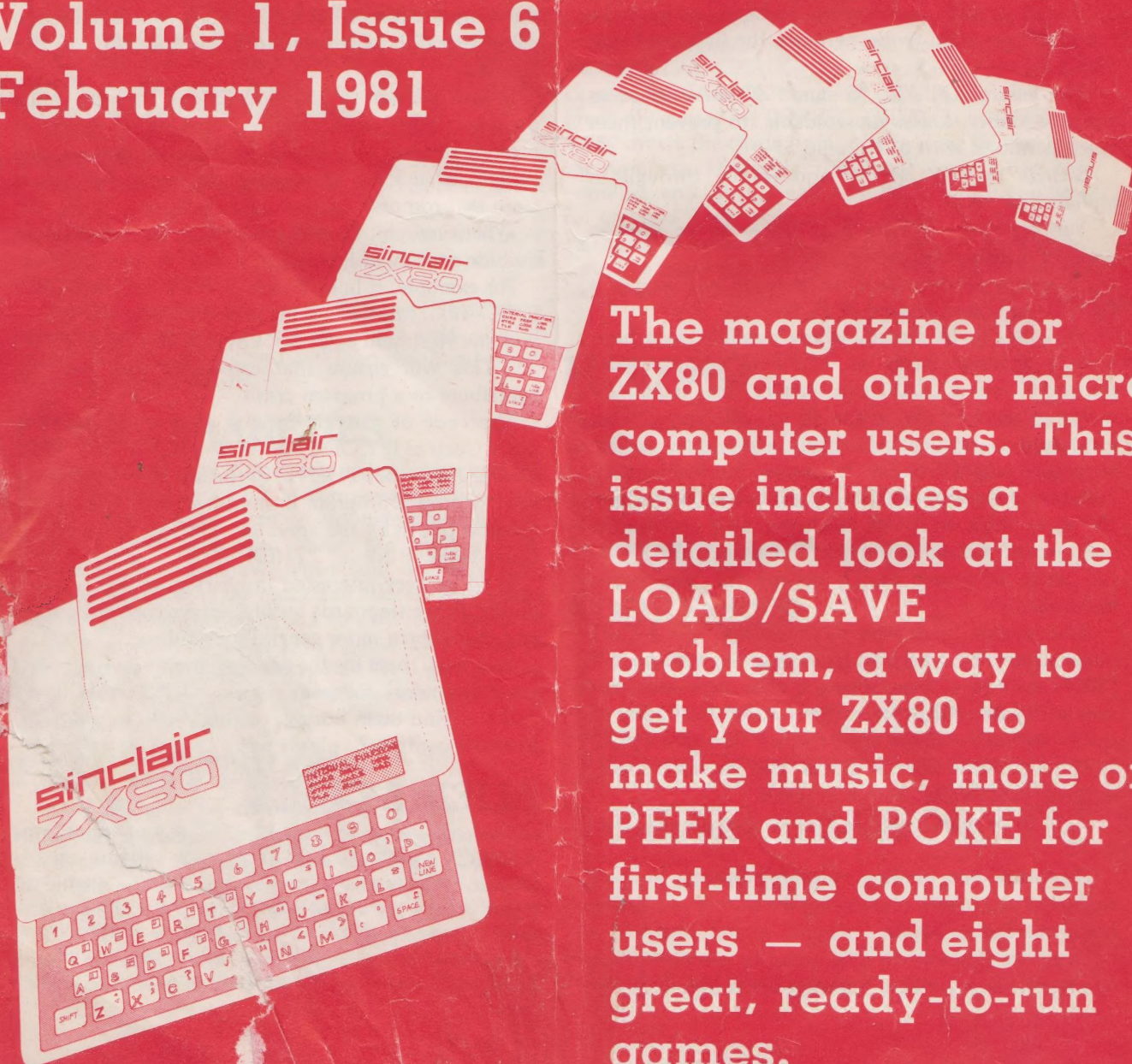
MICRO

ZX80

INTERFACE

USER

**Volume 1, Issue 6
February 1981**



The magazine for ZX80 and other micro-computer users. This issue includes a detailed look at the LOAD/SAVE problem, a way to get your ZX80 to make music, more on PEEK and POKE for first-time computer users — and eight great, ready-to-run games.

SETTING STANDARDS

IT'S TIME WE SET SOME SOFTWARE STANDARDS

It is in everybody's interests to have a set of standards for people writing and submitting software — to make sure it's easy to read and to minimise the chance of mistakes.

From now on, when you send us programs — and you'll probably find it useful to follow the National ZX80 Users Club software standards for your own work as well — could you please make sure they conform, where possible, to the following guidelines:

- .Line numbers to start at 10, and increment by 10 (unless there is a special reason — such as GOSUB 5*A + B)

- .Variables to start at A, and follow through as single letters, in alphabetical order (the same for FOR/NEXT loops and arrays), except where using the same letter could cause confusion

- .Where possible, subroutines to be at, or near the top of the program (with, perhaps, the first line being GOTO ...)

- .The letters "O", "I", "S" and "Z" not be used as variable names, unless unavoidable (to prevent them being confused with 0, 1, 2 and 5)

- .Strings to start at A\$ and follow through in alphabetical order

- .Subroutines — where possible — to be used in place of a long string of IF/THENs

- .Programs to be robust, so they do not require a GOTO command instead of RUN

- .Variables to be stored, where possible, in a non-volatile manner (such as POKEing into a REM statement) so CLEAR can ensure the maximum working memory is available at all times. This procedure is not entirely trouble-free, and is less important with 4K or 16K machines, but can be very useful for programs which must be written in less than 750 bytes (most on the 1K machines cause problems if they exceed around 670 bytes, but with CLEAR you can write programs which occupy the low eight-hundreds).

- .The symbol (an asterisk underlines, with a space either side of it) to be used to show a single space in a PRINT statement, if such space is vital, and would not necessarily be evident from the context. A number of spaces should be shown as 20 PRINT "(3 spaces) YOU WIN", i.e. the number of spaces, and the word space, in lower case letters, within brackets

- .Zero to be represented as the "slashed nought", i.e. 0

These are not binding rules for listing, but are suggested as a means of reducing the chance of a listing being misread.

There are times when it is useful to use more than one letter for a variable (either a word like SUM, or

SCORE, or a combination of letters and digits starting with the letter) but if this will not help your understanding of a listing, stick to single letters, and assign these in alphabetical order.

The standards can be ignored if there is a valid reason, *except* for the use of in a PRINT statement, and 0 for zero.

DOCUMENTATION

Much documentation is a waste of time and paper.

Although computer courses at schools tend to stress the need for documentation, it is — in our opinion — unnecessary in many cases.

The cardinal rule for documentation is: If the algorithm is not transparent, document.

Saying things like "Lines 20 to 50 initialise variables" seems pretty pointless, while it is obviously of value to have supporting notes to a program pointing out things like "Line 370 produces a random number from the seed produced in the previous line, and uses this as a GOTO destination to decide the computer's reaction to the player's move".

It is more important to tell an operator what to do after pressing RUN than it is to tell the operator why the computer does what it does when you do, although most operators will want to know the 'why' in due course.

If you cannot fit the instructions into the main program, either write a shorter, "preface" program, or provide the user with clearly written instructions, and explain what kinds of responses the computer expects from its prompts.

Whenever you have the memory, include lines to exclude unwanted input.

For example, if line 70 says "INPUT YOUR GUESS (1 TO 10)", line 80 will be something like INPUT A, and line 90 should be IF A < 1 OR A > 10 THEN GOTO 70. This will ensure that erroneous data will not contribute to a program crash.

The code of a string can be used to check string input (such as IF CODE(A\$) = 57 THEN... or IF NOT CODE(A\$) = 30 THEN... or the less than sign can be used to stop a program if anything other than " " string is put in by the operator. The line in this could read: IF N\$ > " " THEN STOP.

We'd be very interested in hearing your views on the above standards outline, so we can make them more generally useful.

Please try them for the next version of the National 1 and see if they work for you.

If you find them boring, or if you think they are too avoid confusion, please write to us.

ALIEN ATTACK

We had a touch with the specialists.

Micro-User, Unit 3,

INPUT

Hi. If this is your first contact with the National ZX80 Users Club, welcome along. We publish INTERFACE each month, and in every issue there are at least six complete, ready-to-run programs, reviews and other ideas to help you get the most out of your ZX80.

In the next issue we'll have a complete 4K ADVENTURE game, written expressly for the ZX80, plus six 1K programs. Make sure you don't miss out on your copy of INTERFACE by joining the club today. If you haven't subscribed, you won't hear from us again.

MACHINE CODE

In this issue, Trevor Sharples completes his mammoth work on PEEK and POKE, and very shortly, we'll have an article for your on MACHINE CODE. A number of people wrote into the club after the last issue of INTERFACE (all of them saying how great it was it had turned at last into a 'real magazine') saying that now that they were on top of PEEK and POKE, machine code needed explaining, as did the mysteries of successful LOADING.

Well, we've a major piece inside (written by Mark Charlton and myself) on LOADING and SAVEing. It is based on our own experience, the experience of about 50 club members who wrote to us, plus the information we picked up while discussing the topic with the crew at Science of Cambridge. We hope it will help you.

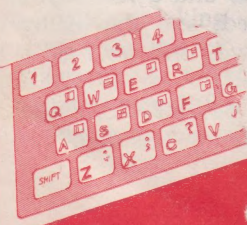
Machine code is not an easy subject, but we're working on an article now (with the help of club members Michael Kirkland and John Bloxham) which we'll be printing shortly.

LOCAL BRANCHES

Please let us know if you start a local branch of the National ZX80 Users Club in your area or school. We want to keep in touch with developments, and we can help you with ideas for sharing with members. Let us know when and where you're starting, and give us the name and address of the area group. So we can help build up each local group as much as possible. If you haven't got a users group in your area, would you like to start one? We'll give you as much assistance as we can, as well as publishing your

SOFTWARE

In the last issue, we asked you to write a program for the ZX80. Many thanks for the programs you sent in. We'll be publishing a choice of good ones in this issue. We've also got a new book for sale, 'The ZX80 User's Guide' by Mark Charlton. It's a great book for anyone who's new to the ZX80. It's only £4.95. Write to us for more details.



YOUR MAGAZINE

INTERFACE is your magazine. We want it to fulfill your needs. Lots of magazines say that, but we really mean it. INTERFACE should be just the kind of magazine you'd produce if you wanted to help people get the most enjoyment out of their ZX80s. So, let us know what you want to see in it. Send us your favourite programs, programming tricks and routines. Tell your friends about us (we'll send free copies to anybody you nominate). Try the programs out, and if you think you can write better ones, or improve the ones we publish, please let us know.

DEATHSTAR DRAUGHTS

If you've got a 4K ZX80, and you enjoy playing Draughts you'll probably find a brand new program — DEATHSTAR DRAUGHTS — a lot of fun. Based on draughts, and featuring full-screen graphics, DEATHSTAR DRAUGHTS features two twists to the old rules — there is a moving warp square which sucks your piece into invisibility (can you lure the ZX80 to fall into a warp) and any piece making it to the other side of the board changes into one of the opponent's pieces. Fast, reliable action. The ZX80 generally moves within 12 seconds, even at the end of the game. DEATHSTAR DRAUGHTS is available on software cassette 4KAA5. On the same cassette are two other great 4K games — BOPPER-BINGO, in which the ZX80 draws the cards (using the moving display) and the numbers, and even crosses out the numbers that come up, and SPACE-STATION, in which you have to try and keep your space station alive, despite shortages of food and oxygen, and attacks from aliens. This is a space-age version of KINGDOMS (and is a lot more fun to play).

MEETING

There'll be a meeting of the National ZX80 Users Club on Tuesday 17th February, 1981 at The Bush Hotel, at 2 Goldhawk Road (the end of Shepherd's Bush Green) at 7.30 pm for a discussion, and question and answer session from 8.15 pm. Tim Hartnell and Trevor Sharples will be there. We'd like to see you.

ADDRESSES

The question of the mailing addresses for the club has puzzled more than a few of you. In its time, the users club has been at Coningham Road, Earls Court Road and now in Ashford. Each change has occurred when the club has out-grown its previous address. Mail from all three addresses is still being collected, but — from now on — we'd like you to write only to the Ashford address. All mail ends up there anyway.

See you in INTERFACE 7

Regards,

Tim Hartnell, Trevor Sharples, Alan Carr,
Mark Charlton
National ZX80 Users Club

MARK'S BYTE

looks at the eternal LOAD/SAVE debate.

IT'S BEEN A HARD DAYS LOAD

If there is any part of the ZX80 where the design fell down in was in that little hole at the back where — in theory — programs come a-dribbling at 300 baud from a cassette player into the receptive RAM of the ZX80. This is the theory. A very high percentage of ZX80 owners have found that the practice is not as straightforward as the theory. Granted that we have a LOAD/SAVE problem, how can we solve it. This article is based on the experience of club members, and a chat with S.O.C.

Firstly, always clean the recording head before LOADING. Use computer quality tapes (preferably C-12's; these are 45p each from Lion House in Tottenham Court Road; many other places sell them). Keep your ZX80 cool, either by adding an external heatsink, or moving the power supply, or — in a more Dali-esque solution — try putting a frozen long-life milk carton just to the left of the 'hump'. Absurd as this sounds, it works quite well (although, as Mr Milgrom of '30 Programs for the ZX80' fame pointed out to me, you have to be careful about drips from the computer getting into the works as the carton melts).

Buy good quality leads (and I don't mean the funny little things you get from S.O.C.) ready made up. Don't let the leads from the ZX80 to the power supply cross over your power supply leads. If you can afford it, get a head demagnetiser (£5 to £11) and use it regularly. Make a security copy on your own machine of any software you buy from another source. You'll find you have far less trouble LOADING programs recorded on your own equipment than you may do with software from another cassette player.

When discussing the problem with S.O.C., it was suggested that some recorders do not cut out the built-in mike while an external mike, or the ZX80, is plugged in. If this is so, there could be noise on the five seconds of silence which precedes a program on tape. Either put on your cloak of inaudibility or stick some cotton wool over the built-in mike if this happens.

The LOADING technique should be: Start the tape. When the silence begins press LOAD then NEWLINE. The ZX80 needs at least half a second of silence to LOAD. Make a tiny, three-line program, SAVE it, and then practice LOADING at different volumes. When you achieve success, make the volume setting (with a stuck-on paper arrow, or a little notch). Then, always set it at this point. Use batteries if you can, and don't use them for anything except your ZX80.

You may find that your success rate deteriorates as you use the tape over and over again. This is because magnetised heads can

gradually erode the program. If you can't afford a demagnetiser, make several copies of each program on different tapes.

I always make three copies on one side of a C12, and then put NOTHING else on the cassette. Then you don't have the hassle of searching through a vast number of programs to find the one you want. And if the first dub doesn't load, you can always try the second, on a slightly different setting.

M R Kent of Aberdeen says he has no problems with his £36 ITT studio recorder 66, and says the record level indicator, tape counter and record level control all help. Previous use of a Philips N2220, he writes, had given unpredictable LOAD due to the output being borderline for the ZX80's requirements. Richard A van Woerden writes that his Prinz recorder will not LOAD at all.

Richard Allan says he has found it useful to connect a small earpiece across the plug lead to the cassette recorder so you can hear what is going on. An AM radio, tuned to Capital (194) will do much the same thing (thinks: should a computer be broadcasting an RF signal?) Theo Armour found his MIC socket did nothing, but that he could SAVE from the EAR! He later found a sneaky little solder bridge. Alan Mayer of Wimbledon said that buying proper computer tapes increased his success rate from near zero to around 80%.

G J Suggett of Chichester writes: I can report that the only problems I have had so far have been caused by a broken connection on the double jack lead supplied with the ZX80... My cassette player is a Boots CTR 500 radio cassette, and I am using a Woolworths tape! On music recordings I often get considerable wow and flutter but this does not seem to have affected the computer program recordings.

From Shrewsbury, Salop, a users club member whose name I can't decipher, says: I bought from Tandy's the tape recorder issued with the TRS-80 (boo, hiss), but found snags. However I thought I'd try Tandy's Realistic Micro Minisette II (does this man have shares in Tandy?) which I found perfect for the job. Secondly, the cassettes are ideal for postage and can be purchased for £1.25. A personal earpiece has been spliced into the load line to ensure the correct beginning of the program.

R M Smith, uses a Sony TCP55 mini tape recorder, and has no load/save problems, "even when using cheap audio cassettes". We should be so lucky.

John and Timothy Edmonds, Grays, Essex, write: We have an Interstate cassette recorder, purchased at Woolworths for £17 and in four months have yet to have a save/load error. One of the development cassettes we use constantly is about eight years old and originally cost 20p. Very Low Fi. The only setting up we did was to find the optimum position for the playback volume, which was just above the 'no load' threshold.

R Hughes in beautiful down country Torquay says he's had no problems using a Prinzsound TR225c cassette recorder. Alastair Murray, of Larbert, Stirlingshire, is not so fortunate. 'Like numerous other uses I have a loading problem, despite trying three separate cassette recorders — a Crown, a Sharp and a JVC radio/cassette recorder...'

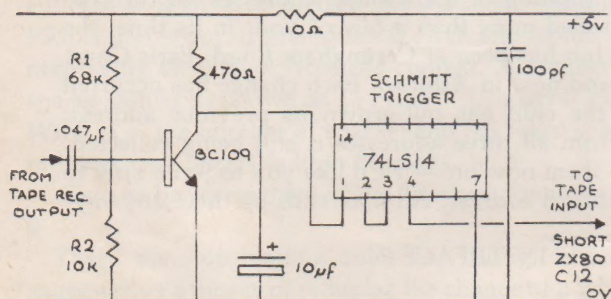
Derek Cooke, from Harrogate, bought a Tandy Realistic which he found hopeless for the job. However, his Fergal T07, with a tone control (most important) works very reliably, and volume set up maximum. Clive Rawlins in Romford (a lot of ZX80 owners out there in wildest Essex) says 'I've had no problems at all with his Sanyo mono radio/recorder. When I was thinking of getting a separate recorder.'

The little circuit in the diagram — could be of use to Crondall, Surrey — could be of use to anyone who are hardware-minded. P J Otterwell, a hardware person (cos he built his ZX80 from a kit) had no loading/saving problems with a Sanyo M2406 F, but the volume set between 6 and 7 and the

Stanley Pattenden, Launceston, has a Sanyo M2406 F, but it's left unplugged until now. He lives in Waller, Wimbourne, and he leaves a 1K resistor from R1 to 2V. from 4V to 2V.

S C Adair, COMPU7, writes: I have programs after soldering up pins 16 and 17 on the keyboard buffer I.C. and the regulator I.C. pins. All programs are recorded at maximum level and played back at the same level. My recorder was bought second hand in a market for £6.00.

For use with low level output from tape deck



Adjust R1 and R2 for different output from tape deck. Made for Sanyo 5050G deck 580MV at 5.6K output. This circuit has given trouble free loading for five months.

Richard King, Stoke Bishop, Bristol, has had no problems with his Ferguson 3270 radio/cassette; and Mike Collins, Elstead, has no hassels with his PRINZ SL-9 now that a friend has provided plugs which are compatible (the S.O.C. ones were not, he reports).

D Tomlison, Micklover, Derby, continues this extraordinarily long saga with the following tale: I purchased an ITT SL59 tape recorder and at first had loading problems. I approached a friend who is more knowledgeable on these matters. He made the following alterations: The loading lead was wired direct from the output signal and a switch was fitted to enable the internal speaker to be disconnected when loading. When saving, I used a made-up lead with one of the 5mm jacks taped up. I now have no problems loading and saving.

Thirteen-year-old Ian Watt, who wrote the much-requested telephone listing program, uses an old reel-to-reel recorder, "at the fastest of the recorder's three speeds". From Denmark, Hasse Taube writes: "Use a small, inexpensive, two-transistor amplifier between the ZX80 and your cassette-recorder...only use best quality cassette tape. I have had luck with "Agfa super ferro dynamic"...the amplifier must be used when you SAVE. It amplifies the output from the ZX80 so you have a more powerful signal to record...I have success now 99% of the time..."

SKETCH PAD

An amazingly short, and important, program for the 1K ZX80 to turn it into a sketch pad. At the first input enter the code number of the character you want to appear on the screen. Then press newline two more times. To move the character you can enter the following letters: R (right), L (left), U (up) and D (down). To change the character you are printing, enter C and then the code of the new character. You can now move this character as before, or you can start in a new position.

To start in a new position enter J and then a number between 1 and 640 (20 lines of 32 squares). You should only use the characters with codes numbers between 1 and 63 and 128 to 191. Picasso must be turning in his grave!

```

1   FOR S=1 TO 20
2   PRINT ""
3   NEXT S
4   LET P=304
5   INPUT C
6   IF C < 128 OR C < 191 THEN
7     C=304
8   END IF
9   LET N=1
10  IF C=67 THEN LET N=1
11  IF C=68 THEN LET N=-1
12  IF C=69 THEN LET N=32
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MAKING MUSIC

The Toccata and Fugue in D minor is possible on the ZX80! However, it would be might difficult to program your little computer to interpret Bach's mighty organ work, and I doubt if Johann Sebastian himself would be overly pleased.

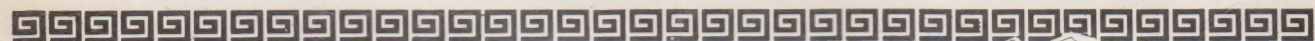
However, even though it is hard work, and despite the fact that the 'music' is somewhat far from the accepted definition of the word, you can get your ZX80 to produce semi-musical noises, under continuous program control.

This is just the bare bones of the music idea. You can use the concept to write music into programs so a win is rewarded with a trill of a few notes, or whatever. The basic routine was suggested by club member Philip Joy, and Trevor Sharples wrote the program. This uses the USR function.

First input the following:

```
10 POKE 17000, 237
20 POKE 17001, 65
30 POKE 17002, 201
```

RUN this program, then delete lines 10, 20, 30 by inputting the line number. Do not press NEW.



PRINT AS

Dear Interface,

I am having difficulty in obtaining a built ZX80 from Sinclair, having now been waiting for seven weeks since I ordered it. The main problem appears to be that I bought a ZX80 manual only a while back, and upon claiming the £5 off the cost of the ready-made ZX80, seem to have thrown Sinclair's organisation into chaos, requiring letters and phone calls to clear it up.

On another point, I ordered "30 programs for the ZX80" from Melbourne publishing, and was dismayed at the number of errors contained within the book. They have promised a copy of their latest edition, which is supposed to be better.

D Oakley, Norwich

The second edition of Mr Milgrom's book has corrected most of the misprints in edition one. When you get hold of the new edition, try out the GOMOKU program. It is really worth playing — and quite amazing within 1K.

Dear Interface,

Many thanks for Interface. The programs and hints you printed have opened my eyes to much wider possibilities for the ZX80 than I thought possible before. I am looking forward to receiving your book from S.O.C.

I bought the ZX80 as an introduction to computing for my 15 y.o. boy, but I find myself completely hooked (at the age of 60!). It has given me more interest and pleasure than I have had in a long time.

E Christie, Cheltenham

Next, input the following program:

```
10 INPUT A
20 INPUT B
30 INPUT C
40 FOR D = 1 TO 30
50 FOR E = 1 TO A
60 RANDOMISE USR (17000)
70 NEXT E
80 FOR E = 1 TO B*D
90 RANDOMISE USR (17000)
100 NEXT E
110 FOR E = 1 TO C
120 RANDOMISE USR (17000)
130 NEXT E
140 NEXT D
150 PRINT "HERE WE GO AGAIN"
160 INPUT AS
170 IF AS = " " THEN GOTO 10
180 STOP
```

Try this with 50, 60 and 70 for A, B and C. Then experiment with other values. You'll need to turn the volume of the television to maximum to hear the music, and you'll probably get best results at a slightly different channel setting to the one where you normally 'watch' the ZX80 in action.

(Adapted from the book 'MAKING THE MOST OF YOUR ZX80' by Tim Hartnell, published by Computer Publications.)



Dear Interface,

In INTERFACE 5 (much incidentally) you asked us to software purchased. I have 1 cassettes, and I can say the offered by Ken Macdonald programs range from TRU (breakout and space intru the ZX80 the generate m

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Jonathan Cranston, Ormskirk

LOOKING AT BOOKS

This month I'll be looking at two more books written especially for the ZX80, and another book of standard BASIC programs as well.

THE ZX80 MAGIC BOOK (Timedata = £4.95) is to be warmly welcomed as it is a good 'fun' book. It's very readable (with natty cartoon touches) without being too simple. Most importantly, I think, it stimulates your imagination and doesn't leave you with the 'now that I've played Hunt the Nim and Towers of Hurkle what can I do' feeling.

There are several programs for you to try your hand at including a couple of 'upper memory' — i.e. 4K — games. Their listing of Kingdoms (I can't spell Hammuraburi) looks very interesting — I keep trying to find time to play it. There are sections on music — although they seem to spend more time telling you about the theory behind music than they need to — and the use of graphics. The last part of the book has some interesting reading on the hardware of the ZX80 and explains it in terms that even a book reviewer can understand.

This is not a book to teach you BASIC programming — and neither does it purport to be. Rather, it is for those with some working knowledge of BASIC who are looking for something to do with it. The ZX80 Magic Book doesn't take itself too seriously and that's where it wins. Definitely worth a place on your bookshelf.

THE ZX80 POCKETBOOK (Phipps Associates = £4.95) is of a more serious nature. It is a book intended for the novice BASIC programmer but it is written in such a way that you feel the author is restraining himself from saying some things for fear of confusing the reader. They obviously know their stuff do Phipps Associates. I would, however, disagree with their claim! Developing plenty of REM statements. With too many REMs you will never get enough memory!

The book contains plenty of guidelines on how to go about writing programs, dealing with data storage and retrieval — particularly SAVEing in the trade — on cassette tapes. The book doesn't contain many examples of programs (all) but they have the advantage of being available on cassette from the publisher. For the games player, are there any examples? — but they play up their educational credentials, devoting several pages to explaining the idea of their program. This sort of explanation appears to be aimed at the person who wishes to consider the meaning of each command/statement it does.

them together to help you improve your programming skills.

The appendices carry the by now obligatory ZX80 opcodes (machine code commands) — even though the book doesn't tell you how to use them — graphics table etc.

As a book for the novice games enthusiast who wants to write his own games — think again. As a book for the more serious programmer and as a basic reference work — recommended.

101 BASIC COMPUTER GAMES (Creative Computing = £5-£7) contains computer programs written in MICROSOFT BASIC, the subset of the language that the PET, TRS-80 and others use. The disadvantage of this book, for ZX80 owners, is that a lot of work is needed to 'translate' the listings into ZX80 BASIC. Addings LETs and THENs and adjusting the random numbers is easy, but getting over the lack of moving graphics and scrolling is another thing altogether.

Most of the programs in the book are time-tested favourites(!) — and their variations. They are written to be 'portable' between MICROSOFT using machines so they don't use machine-dependent functions (PEEK, POKE, USR, character codes etc). Each listing is complete with a sample RUN. This way you can see what the game looks like before you decide to spend ages converting it and typing it in. Most of the programs are probably not worth the bother of converting, but it is a useful book to glean ideas.

This is purely a book of programs — the first of its kind I believe — made up from the best programs that first saw the light of day in 'Creative Computing'. Mr Ahl has followed this up with a second book, 'MORE BASIC COMPUTER GAMES', but it appears to have been a struggle to find 85 MICROSOFT programs. The second book is only a poor follow-up to the first.

Verdict: excellent for MICROSOFT users, but the ZX80 user would be better off borrowing a copy than buying one.

• ALAN CARR



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PEEKING AT POKE

(PART 2)

This is the second and concluding part of an article intended to open the eyes of the beginners to the uses of PEEK and POKE. I feel that I should stress the fact that it is written for the beginner to BASIC programming. In my first article I glossed over the way the computer stores its line numbers as it was not relevant.

However, this has been picked up by some of our 'eagle-eyed' readers. So if any confusion occurred because of the way I said things then I apologise. Storing line numbers is an altogether different kettle of fish. I was merely trying to explain in the simplest way possible why you see the number 50 — and hence the character M — in address 16425.

Last month I explored the most versatile use of the PEEK and POKE commands — the storage and alteration of information in a program listing. In this concluding part of the article I will attempt to show you how to use PEEK and POKE in other ways. Namely the POKEing of characters directly onto the screen and — take note Mr J. F. Horton — the accessing of addresses lower than 16424.

Taking the last point first — as good a way as any to start — it must be said that a good knowledge of internal computer operations is needed to get the best out of PEEKing and POKEing these lower number addresses. Why? Because these addresses are set up and used by the computer itself. The ROM — the 'soul' of the ZX80 — sits beneath the RAM — the 'brain'. When you switch your ZX80 on (known as 'powering-up' in the trade) the first few addresses of the RAM are taken up by the computer to set up the 'system variables'. These 'system variables' include such things as the pointer to the start of the display file (which is discussed at length later), the 'timer', the seed for random numbers and so on. The ZX80 manual contains a full list of these variables in Appendix III.

These 'system variables' can easily be accessed by your programs. I would not advise the newcomer to ZX80 programming to POKE things into addresses lower than 16384 as this is now very definitely ROM area. You could probably get away with things in the 'unused' areas (see diagram) but it's not worth risking anything happening to your ZX80 — unless you really like waiting for deliveries from SOC. Anyway, I haven't got the space to go into details about POKEing and PEEKing the ROM.

Layout of ROM & RAM for 1K ZX80. 'Unused' areas contain reflections of 4K monitor.

4K ROM — BASIC INTERPRETER & MONITOR	0
Unused	4096
Unused	8192
Unused	12288
RAM - programmeable memory	16384
	17408

System variables	16384	Detailed layout of RAM for 1K ZX80
Program listing	16424	
Variable store		
Work area		
Display file		
Stack	17407	

The example of PEEKing and POKEing that Uncle Clive gives in his manual uses the 'timer' — one of the 'system variables'. The short program below does much the same thing as the program in the manual.

```

10 PRINT "SPEED TESTER"
20 PRINT
30 PRINT "PLEASE ENTER YOUR NAME"
40 INPUT A$
50 PRINT
60 PRINT "PRESS NEWLINE WHEN YOU SEE
  YOUR NAME APPEAR ON THE SCREEN"
70 PRINT
80 PRINT "PRESS NEWLINE TO START"
90 INPUT B$
100 CLS
110 GOSUB 230
120 POKE 16414, 0
130 POKE 16415, 0
140 INPUT B$
150 PRINT "YOU TOOK ";PEEK(16414)+256*PEEK
  (16415); "MILLISECONDS TO REACT, ";A$
160 PRINT
170 PRINT " TO TEST YOUR REACTIONS
  AGAIN"
180 PRINT "PRESS NEWLINE. ENTER ANY
  LETTER"
190 PRINT "TO STOP"
200 INPUT C$
210 IF NOT C$=" " THEN STOP
220 GOTO 60
230 FOR A = 1 TO RND (60)
240 NEXT A
250 PRINT , A$
260 RETURN
  
```

The TV frame-counter 'timer' in the ZX80 — 16415. The numbers in these addresses are set every second — once for each 'scan' of the screen. These two addresses with 0 sets the 'timer' to zero. The smooth, continuous scrolling of the computing reaction timer. The longer you wait, the higher the numbers in the address, the faster the increment 50 times a second.

To be exact in your timing, the value as this compensates for the delay to the processor 80 msec.

Other useful 'system variables' are 16384 and 16393. A man's name (variable store) is stored in the MUSE.

9999 PRINT PEEK(16384) This little routine will tell you the address of the variables manipulated the number of the program start of the program account of the number of line 9999 — program is the number of listing is the number of bytes of information as each address holds one byte of information.

Other useful 'systems variables' include addresses 16420 and 16421. Address 16420 holds the current position of the last character printed along a line. POKEing this value with 0 tells the computers to start printing on the next line. Try this little program:

```
10 PRINT "***";
20 IF RND (5) = 1 THEN POKE 16420, 0
30 GOTO 10
```

If line 20 wasn't there you would expect the ZX80 to print a screen full of asterisks. But every time the random number is 1 the computer will be fooled into thinking the line is full (contains 32 characters) and start printing on a new line.

Address 16421 holds the current position of the last line to be printed on the screen. POKEing this value with 24 will get rid of the error code at the bottom of the screen::

```
10 FOR A = 1 TO 80
20 PRINT "INTERFACE";
30 NEXT A
40 POKE 16421,24
```

This should print out a screen full of the word 'Interface' without an error code at the bottom.

Ian Wright has used both these two 'system variables' in his program 'Space Dock' which appeared in 'Interface' 4.

The one other set of 'system variables' that can be put to good use are the two addresses 16396 and 16397. The numbers held in these two addresses act as the pointer to the start of the display file. That means that a manipulation of the values of these addresses gives you the address number of the first square of the screen display. This is how we find out where to POKE things onto the screen. However, the ZX80 can't POKE things into nothing. You have to fill the display file — in other words the screen — with something to POKE into. Spaces will do quite adequately for this purpose. Try this little program:

```
10 FOR A = 1 TO 20
20 PRINT ",,"
30 NEXT A
40 INPUT B
50 POKE PEEK(16396)+PEEK(16397) * 256 + B, 128
60 GOTO 40
```

The first three lines set up a screenful of spaces — yes! you can use commas. The ZX80 will print out 8 spaces for each comma. Once the screen is set up you can start to POKE things into it. Line 50 manipulates the display file pointer value and adds B to it.

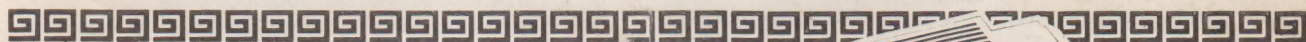
If you enter the value 16 you should see an inverse space appear somewhere along the top line. A value of about 300 should print out at somewhere close to the middle of the screen. Notice how quickly it does everything. That is because the screen doesn't have to be printed every time — only the inverse space. Of course, you don't have to print an inverse space everytime. You could change line 50 into: POKE (PEEK (16396) + PEEK(16397) * 256) + RND(640) , RND(10) + 129.

If you RUN the program with this line you have given the computer a free hand in 'creative graphics'. Each time you press newline — and almost instantaneously I might add — a random graphical character will appear at a random spot on the screen.

I'm sure you can see the potential of using a routine such as this to POKE characters directly onto the screen. While it's not exactly moving graphics it's a step closer than printing out the screen every time. Feel free to use any routine/program from this article. Play around with them until you get used to them. I'm sure that they will prove to be of immense value.

If you are still unsure of anything in this article or have any points that you would like to raise then please don't hesitate to drop me a line (address it to the National ZX80 Users Club) and please include an SAE if you want a reply. I hope that this attempt at laying bare the bones of PEEK and POKE for beginners has been of interest and use to all.

Trevor Sharples



SOME OF THE NICE COMMENTS WE GOT ON THE ISSUE:

on the new layout —
pool

issue of INTERFACE. It has
length to strength — Ian Craig,

orte. ase return my £2 — J Taylor
able the pro... od magazine — J Horton,
program show...
on pocket cal... since applying INTERFACE

```
1 LET ...
2 ... see INTERFACE come
... eat and I think I can
4 ... 5 than all the others
5 ... POKEing! — I Wright,
```

```
6 ...
7 ... shall be in my 70th
8 LET B ... I would like to
11 LET S ... — F Williams,
```

```
12 ...
13 ... of INTERFACE. I
... it but find it very good
... have a clear ...
... the amount of R^ ...
... programs on ... (of
... any 1K ZX80 ...
... the
mag
```



. This is the first time I've written since my application to join, and it was in that letter that I posed the problem of the factory foreman who had to build chairs and stools etc. If R Peel of Kennington also sent that problem that's an unbelievable coincidence — G Love, Gravesend (ANOTHER NOTE: Gee, I guess we boobed — again, sorry mate)

. I have just received issue 5 and I was very impressed — keep up the good work — Michael Scott, Tyne and Wear

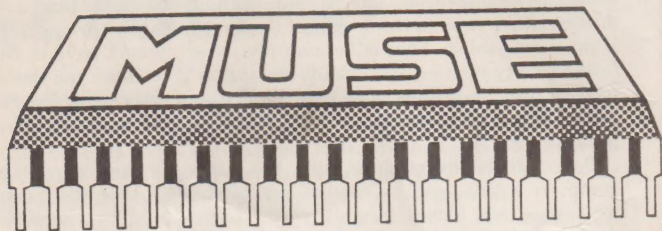
. Thanks for Issue 5 of INTERFACE — in its new format it looks just like a real magazine — Keith Mead, Cheltenham (who confesses in his letter that he is a member of, dare we mention it, that other club)

. Why won't Alien Attack work? — Gordon Roxby, Manchester

. Without doubt, Alien Attack was the best program in the issue, it was a fine example of minimum flicker graphics — Ian Turtle, Ashby

. I see the "deliberate mistakes" continue. Anyway, congratulations on the new INTERFACE. It shows every promise of being well worth the annual subscription — Alan Christie, Cheltenham

THE ZX80 IN EDUCATION



MINICOMPUTER USERS IN SECONDARY EDUCATION

In INTERFACE, January 1981, the first new super-duper INTERFACE, Tim reported that I have set up an Educational ZX80 User's Group. He has invited me to take up a bit of space here, to report developments in that major applications field.

EZUG — OK, I know it's a horrid acronym — has in fact been set up under the umbrella of MUSE. MUSE is a fairly ancient organisation now — it was founded half a dozen years ago with the name Mini-computer Users in Secondary Education. The "mini" now includes "micro", and the "secondary" includes primary and tertiary — but the name lives on, while members desperately think how to widen the translation of MUSE to cover all relevant fields.

Now that micros have burst into education, the membership of MUSE has grown explosively. The association offers a variety of services for a can't-be-beaten annual sub of £5.00. Their magazine, *Computer in Schools*, is alone worth that paltry sum. But in addition there are all manner of user groups, including EZUG of course; thriving local associations with many well-attended meetings; a major annual conference; technical query services; and a growing software library.

I sincerely recommend all teachers of computing, and all teachers using computers, to consider joining MUSE. Drop a line to Bob Trigger, 58 Chadcote Way, Bromsgrove, Worcestershire, for details.

WHY TEACH WITH THE ZX80

When the Sinclair computer first appeared a year ago (less the renowned delivery time) it was rightly hailed as a breakthrough. The breakthrough was that at last cheap, powerful and simple computing was within reach of "the masses". With ZX80 sales in Britain now running higher than those of all other personal computers, the 1960's version of a computer in every home no longer seems unattainable. The basic ZX80 is so remarkably easy to set up and use, and its BASIC is such a delight, that we all know primary age

children who "talk to it like an old friend". Within a decade this country will have many thousands of "computerate" young people — and the benefits of that pool of automatic expertise will be incalculable. By that time, no doubt, the ZX80 will have been submerged by even better, cheaper machines. But the trend will have been set.

All the home computing benefits of the ZX80 apply to education as well. The basic version is so cheap that a primary school can easily afford one. Indeed there are local education authorities considering it as standard for their junior schools. At the secondary level we now have the situation where, even with those drastic cuts, a computing department can have half a dozen ZX80s and thus almost remove the crucial queuing problem. Similarly the science and mathematics departments can have a ZX80 in each room. Even with full RAM and ROM, a second-hand TV set each and a shared cassette recorder, the bill for that equipment is less than the cost of a single RML 380Z (the most common micro in secondary schools).

As far as educational computing is concerned, the following functions must be fulfilled:

- * easy use by novice teachers;
- * easy use by novice pupils in computer awareness classes;
- * easy yet sophisticated use by computer studies, science and math's students;
- * flexible programmability, with good graphics, in those and other subject areas;
- * effective use for computer-aided instruction;
- * effective use in gaming for the computer club;
- * easy extendability to control techniques;
- * effective file-handling.

Just about all of these, except perhaps the last, are theoretically offered by the ZX80. "Theoretically" because the recorder interface and the RAM expansion must still be debugged, the ROM and printer have still to appear, and no one has yet explored all the machine's potential.

WHAT ABOUT EZUG?

It seems to me that the Educational ZX80 Users' Group, ably assisted by the Sinclair User, should have the following functions:

- * to join with the other educational computer groups in education;
- * to join with the other educational computer groups in the smooth, effective and rapid development of the SOC computer in its educational context;
- * to collate and circulate tips, ideas and news for educational ZX80 use;
- * to build up the ZX80 section of the MUSE software library;
- * to assist in the development of software and documentation standards for the ZX80.

In the January 1981 editorial in the January INTERFACE, the first in the last direction was started. It would be very helpful if the resulting progress were related to the MUSE software standards as far as possible.

In my next piece I shall develop this theme, and also explain how the MUSE software library could make you rich.... Meanwhile send me an s.a.e. for further details or write to me c/o INTERFACE.

Eric Deeson
Highgate School
Birmingham B12 9DS



MATHS TUTOR

M.D. Stuart's Maths Tutor is a self-explanatory program — and also requires at least 2K of memory. If your maths is a bit rusty then this is the program for you. Cutting out the PRINT statements in lines 13 to 66 and shortening in lines 360 to 364 should enable the program to run on the 1K ZX80. This is the machine we have come to depend

```

4
3
4      LET NS=" NO"
5      LET GS=" GOOD"
6      LET CYC=0
7      LET BAD=0
8      LET S$=" "
11     LET OS=" / "
12     LET OS=" / "
13     PRINT "*****THIS IS OUR MATHS
14     PRINT
15     PRINT
16     PRINT "MY NAME IS ZED"
17     PRINT

```

```

20     PRINT "WHAT IS YOUR NAME?"
30     INPUT Z$
40     CLS
50     PRINT "I HOPE YOU HAVE FUN ";Z$
60     PRINT
61     PRINT "PLEASE REMEMBER / IS DIVIDE"
62     PRINT "X IS TIMES"
63     PRINT "+ IS ADD"
64     PRINT "AND * * * * - IS SUBTRACT"
65     PRINT "-----"
66     PRINT
70     LET D=RND(5)
80     IF D=3 THEN GOTO 290
90     LET A=RND(20)
100    LET B=RND(20)
101    IF(B>A OR B=A) AND D>3 THEN GOTO
110    LET L=PEEK(16421)
111    IF L<10 THEN CLS
112    PRINT W$;A;
120    IF D=1 THEN PRINT P$;B;
130    IF D=2 THEN PRINT M$;B;
140    IF D=3 THEN PRINT T$;B;
141    IF D>3 THEN PRINT O$;B;
150    INPUT C
160    IF D=1 AND C=A+B THEN GOTO 320
170    IF D=2 AND C=A-B THEN GOTO 320
180    IF D=3 AND C=A*B THEN GOTO 320
181    IF D >3 AND C=A/B THEN GOTO 320
200    LET BAD=BAD+1
201    PRINT S$;C;N$
210    IF BAD <3 THEN GOTO 110
220    LET A=A-1
230    LET BAD=0
240    IF A>0 THEN GOTO 110
250    LET B=B-1
260    IF B=0 THEN LET B=RND(5)
270    LET A=RND(12)
280    GO TO 110
290    LET A=RND(12)
300    LET B=RND(12)
310    GOTO 110
320    PRINT S$;C;G$
330    LET BAD=0
331    IF D=5 THEN GOTO 380
340    LET CYC=CYC+1
350    IF CYC<50 THEN GOTO 70
360    PRINT "THANKYOU "Z$,"FOR YOUR
361    PRINT "DO YOU WANT SOME MORE
362    INPUT V$
363    IF V$="YES" THEN GOTO 60
364    PRINT "PROGRAM TERMINATED"
370    STOP
380    CLS
390    PRINT A;O$;B;" IS ";C;"," HOW '
400    INPUT R
410    IF (B*C)+R=A THEN GOTO 430
411    PRINT R,"THINK AGAIN"
412    GOTO 390
430    PRINT R
431    PRINT "WELL DONE ";Z$
440    GOTO 340

```

© M. D. STUART

MAGNIFICENT SEVEN

Fleas a jolly good fellow! Run your own flea circus, with a little help from ringmaster Stuart Lucas. Seven tiny fleas (heavily disguised as CHR\$(2) and CHR\$(130)) bounce and bop across your TV screen. Which one will win? And there's more. This is a sophisticated game. If the flea falls in a ditch, it goes back to the start. Wow, and away we go.

```

10 PRINT " FLEARACE"
20 DIM A(7)
30 LET B=0
40 LET C=0
50 RANDOMISE
60 FOR I = 1 TO 7
70 PRINT I;
80 IF C = 0 THEN LET A(I) = 1
90 IF C = 1 THEN LET A(I) = A(I) +
  RND(5)
100 FOR J = 1 TO 30
110 IF J = 8 THEN GOSUB 320
120 IF A(I) = 8 OR A(I) = 9 THEN LET A(I)
  = 1

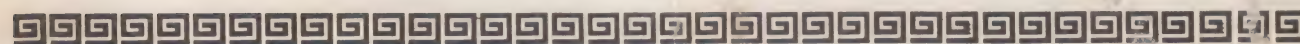
```

```

130 IF J > A(I) AND J > 9 THEN GOTO 180
140 IF J > A(I) AND J < 9 THEN PRINT
  CHR$(0);
150 IF J < A(I) THEN PRINT CHR$(137);
160 IF J = A(I) THEN PRINT CHR$(20);
170 NEXT J
180 IF A(I) > 30 THEN LET B = 1
190 PRINT
200 PRINT ,CHR$(2); CHR$(130)
210 NEXT I
220 IF B = 1 THEN GOTO 280
230 PRINT "HIT NEWLINE"
240 INPUT AS
250 IF AS = " " THEN CLS
260 LET C = 1
270 GOTO 60
280 FOR I = 1 TO 7
290 IF A(I) > 30 THEN PRINT
  "FLEA ";I;" *WINS"
300 NEXT I
310 STOP
320 PRINT CHR$(2); CHR$(130);
330 LET J = 9
340 RETURN

```

© STUART LUCAS



A GRAFTY LITTLE PROGRAM

Andrew Field, obviously a keen geometrician, has sent us this witty little graph plotting program. And plot away it does. Just enter the equation of your choice (see line 400) and the zippy little machine goes to work, printing shift F's and shift W's with abandon all over your telly.

```

10 GOTO 400
15 LET W=1
20 GOSUB 500
30 FOR X=-9 TO 9
40 PRINT
50 IF X < 0 THEN PRINT X;" ";
60 IF NOT < X 0 THEN PRINT " ";X;" ";
100 LET Y=X+000000000000000000000000000000
110 LET Y=Y/W

```

```

130
140 Y <
150 IF Y > 0 TH
160 NEXT J
170 NEXT X
180 PRINT
190 PRINT " *Y
  *20 * * *
200 PRINT "
210
300 LET
310 GOTO
400 PRINT "CON
410
420
430
440
450
460
470
480
500
510
520

```

GRAPH OF Y=";B\$;

© ANDREW FIELD

BAD KING JOHN

You are King John, the ruler of a kingdom which has to be governed successfully for twenty years. You start off with 500 people, 2500 sacks of corn and 100 acres of land. Each subject can plant two sacks of corn, and needs four sacks to eat. If more food is supplied than is needed, a population increase will follow. If more than one quarter of the population starve in any year, an assassination will be attempted. There is a one in three chance of this succeeding. Each acre of land is capable of supporting eight sacks of corn. If less than three quarters of the land is planted, then one quarter will be lost the next year. If more than three quarters of the land is used, then one quarter is gained the next year. In a good year, the corn planted will increase six times, in an average year it will increase four times and in a bad year it will increase by two.

The program will fit the standard 1K ZX80, Mr Bambrough says.

```

10 LET Y = 1
20 LET P = 500
30 LET C = 2500
40 LET G = 100
60 PRINT "YEAR": Y
70 PRINT "PEOPLE": P
80 PRINT "CORN": C
90 PRINT "LAND": G
100 C = 0 OR G = 0

```

D? MAX "C"

() French Vocabulary M.T.

National ZX80 Users Club Unit 3, 33 Woodthorpe

Name

Address

```

320 RANDOMISE
330 LET X = RND(3)
340 IF NOT X = 1 THEN GOTO 390

```

```


350 CLS
360 PRINT "YOU HAVE BEEN ASSASSINATED"
370 STOP
380 PRINT D; "PEOPLE GAINED"
390 LET P = P + D
392 PRINT "CROP -";
395 RANDOMISE
400 LET X = RND(6)
410 IF X = 6 THEN GOTO 470
420 IF X > 3 OR X = 3 THEN GOTO 450
430 LET C = C + (S * 2)
435 PRINT S * 2
440 GOTO 480
450 LET C = C + (S * 4)
455 PRINT S * 4
460 GOTO 480
470 LET C = C + (S * 6)
475 PRINT S * 6
480 IF Y = 20 THEN GOTO 510
490 LET Y = Y + 1
492 INPUT AS
495 CLS
500 GOTO 60
510 CLS
520 PRINT "YOU WIN"

```

© F. BAMBROUGH

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The best-selling manual on the Sinclair ZX80 covers ZX80 BASIC, hardware and programs and has a detailed explanation of the ZX80 Monitor, routines and entry points. A routine for generating moving displays is also included.

- Ch.1 — Operating the ZX80
- Ch.2 — Theory of Computers
- Ch.3 — ZX80 BASIC
- Ch.4 — The ZX80 Monitor
- Ch.5 — Construction and Hardware
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LINSAC 68 Barker Road, Linthorpe, Middlesbrough, Co. Cleveland TS5 5ES

A program here by Steve Dean that keeps track of your personal accounts. All the variables can be saved, so you can keep a running account over several months (or years!). If you save the variables remember to use GOTO 1 rather than RUN, otherwise you will clear them all ... and that means loading the program again.

PERSONAL ACCOUNTS

```

5      LET MAX=6
11     DIM A(6)
20     GOSUB 900
30     PRINT "ANY CHANGES?"
35     INPUT Z$
40     IF Z$="N" THEN GOTO 100
50     PRINT "NUM"
52     INPUT NO
55     IF NO > MAX OR NO < 1 THEN GOTO
      52
60     PRINT "NEW AMOUNT"
65     INPUT AM
70     LET A(NO)=AM
80     GOTO 20
100    PRINT "ENTER SALARY"
110    INPUT SAL
120    GOSUB 900
130    PRINT "SPENDING CASH £"; SAL-TOT

```

```

140    GOTO 30
900    LET TOT=0
901    CLS
910    FOR F=1 TO MAX
916    PRINT F;" ";
920    GOSUB F*1000
930    PRINT "£";A(F)
935    LET TOT=TOT+A(F)
940    NEXT F
950    PRINT
953    PRINT "TOTAL £";TOT
955    PRINT
970    RETURN
1000   PRINT "DEPOSIT A/C ";
1005   RETURN
2000   PRINT "ACCESS ";
2005   RETURN
3000   PRINT "RENT ";
3005   RETURN
4000   PRINT "MORTGAGE ";
4005   RETURN
5000   PRINT "STANDING ORDERS ";
5005   RETURN
6000   PRINT "BUILDING SOCIETY ";
6005   RETURN

```

© STEVE DEAN

ZX80 CLASSIFIEDS

You can advertise in INTERFACE. Personal ads (contacts, selling off unwanted memory boards, ZX80s, Apples, PETs and the like) are £2 for the first 20 words, 15p each additional word. Business ads (including all ads to sell software) are £5 for the first 20 words, 20p each additional word. Payment must accompany booking. Display rates on application.

FOR SALE. 3K RAM memory expansion board, and 2K RAM. £15. Phone Kevin Palmer on 449 1049. Kevin is also interested in getting hold of photocopies of the first two issues of INTERFACE and would like to hear from other club members in the New Barnet area.

ZX80 INVADERS (4K). At last, machine code version of the now-famous pub game, with continuous display and fast moving graphics. On-screen scoring. £5 for listing — J Edmonds, 29 Chestnut Ave., Grays, Essex.

ZX80 memory expansion board and 2K RAM chips. £35 o.n.o. S Brumby, 38 Eastfield Road, Messingham, Scunthorpe, South Humberside, DN17 3PG. Mr Brumby would also like to hear from other club member in his area.

SHARP PC-1211 USERS CLUB. The club operates from 281 Lidgett Lane, Leeds, LS17 6PD, and produces a neat little newsletter called OUTPUT. Send an s.a.e. for a free copy if you own a PC-1211. They are particularly interested in hearing from people who own both ZX80 and a PC-1211.

SECOND LONDON COMPUTER FAIR. Organised by the Association of London Computer Clubs, on April 14, 15 and 16, from 10am to 6pm (7pm on the 15th). Retail exhibitors, hobbyists, workshops, bring and buy. Admission is 75p. At the Polytechnic of North London theatre, opposite Holloway Road tube station. The National ZX80 Users Club will be there.

MAKE SURE your junior school pupil has a sound background in English, Maths., General Knowledge and Reasoning. Coaching available on cassette £4.50. Send cheque or s.a.e. for further details to:- ROSE CASSETTES, 143 Widney Lane, Solihull, West Midlands B91 3LH.

MORSE SIGNALLER (1K RAM). Incorporates machine code subroutine to output audible morse signals through cassette. Variable signalling speed. Three page Manual plus cassette £3.
 GRAPHICS PACKAGE (1K RAM). Large Print, Draw A Picture, Plot A Manual plus cassette £8.
 MULTITEXT (4K and 8K versions) plus altogether 10 page illustrated Manual plus BRIDGE SOFTWARE, 35 Fernwood, Mar, SBE.

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John Hume's 'Life' program must rate as one of the shortest ever written for the ZX80. Type in the program as written and RUN it. You can now enter your starting colonies as values between 0 and 99. When you have entered all the starting colonies then enter the number 100. This stops the program. You can now delete line 1 and 2. To start the program use the instruction GOTO 10 and press newline for successive generations. Pretty impressive, eh? I bet you cant work out what's going to happen from the listing!

```

1  DIM A(99)
2  DIM B(99)
3  INPUT L
4  LET A(L) = 1
5  GOTO 3
10 CLS
20 FOR L=0 TO 99
23 IF L-(L/10)*10=0 THEN PRINT
24 IF A(L)=1 THEN PRINT "0";

```

```

25 IF A(L)=0 THEN PRINT " ";
30 LET J=L<11 AND 100
40 LET K=L<10 AND 100
50 LET M=L<9 AND 100
60 LET N=L=0 AND 100
70 LET P=L=99 AND 100
80 LET Q=L>90 AND 100
90 LET R=L>89 AND 100
100 LET S=L>88 AND 100
110 LET C=A(L-11+J)+A(L-10+K)+
    A(L-9+M)+A(L-1+N)+A(L+1-P)+
    A(L+9-Q)+A(L+10-R)+A(L+11-S)
120 LET B(L)=C=3 AND 1 OR (C=2 AND
    A(L)=1) AND 1
130 NEXT L
140 FOR L=0 TO 99
150 LET A(L)=B(L)
160 NEXT L
170 INPUT GS
180 IF GS=" " THEN GOTO 10

```

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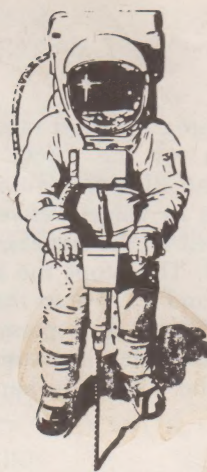
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A lunar lander with a difference. You have to take off from Earth and cross the timeless void of space to land on the moon — well not exactly timeless as everything is measured in the new interstellar unit of sinclareseconds. The on-board computer can compensate of Earth's gravity, so all you have to do is enter a thrust against the Moon's gravity. A thrust < 4 will speed up while a thrust > 4 will slow you down — but be careful not to fly out of orbit. The Interspace AA charge a lot for their services! A thrust of four will keep your velocity constant. Your duration of thrust should be a low number unless you like digging craters — an example of "Craterive Computing" (sic.). Happy landings.

```

10  LET V = 0
15  LET D = 0
18  LET K = 0
20  PRINT " THIS IS THE ONBOARD
    COMPUTER: "
30  PRINT " TYPE IN FORCE AGAINST
    GRAVITY"
40  PRINT " THEN DURATION
    (SINCLARESECS)"
45  LET K = K + 1
50  INPUT F
60  INPUT T
70  LET A = 4 - F
80  LET D = A*T*T/2+V*T+D
81  LET V = V+A*T
82  CLS
85  IF D < 0 THEN GOTO 350
90  IF D = 28 THEN GOTO 250
100 IF D > 28 THEN GOTO 310
110 CLS
120 PRINT " (2 shift A)";
130 IF D = 0 THEN GOTO 170
140 FOR J = 1 TO D
150 PRINT " _ ";
160 NEXT J
170 PRINT "(shift D)";
180 FOR J = 1 TO 28 - D
190 PRINT " _ ";
200 NEXT J
210 PRINT "(shift A)"
220 PRINT "(2 shift A)"
230 PRINT "DIST=";D*10;" SPEED=";V*10
240 GOTO 30
250 IF V < 1 THEN GOTO 470
255 PRINT "(shift S) SUCCESSFUL LANDING
    (shift S)"
260 PRINT " _ _ _ (2 shift W)(shift D)"
270 PRINT " _ _ _ ";
    CHR$(128);CHR$(128);"(shift Q)"
280 PRINT " _ _ _ (3 shift Q)"

```



```

290 PRINT "(7 shift A)"
300 GOTO 400
310 PRINT " *BOOM"
320 PRINT " _ < > "
330 PRINT "(7 shift A)"
335 PRINT " CRASH LANDING CRASH
    LANDING"
340 GOTO 400
350 CLS
355 PRINT " YOU ARE OUT OF ORBIT"
360 GOTO 230
400 PRINT " YOU TOOK ";K;
    " SINCLARESECS"
420 PRINT " ENTER L TO RESTART"
430 INPUT AS
440 IF NOT AS = "L" THEN LIST
450 CLS
460 RUN
470 PRINT " TOO FAST..."
480 GOTO 310

```

We don't know who sent us this — please write in so we can say good things about you.

**Next month
INTERFACE includes
the full listing of a
superb 4K
ADVENTURE, written
just for the ZX80 —
plus a list of National
ZX80 User Club
members wanting to
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